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OUR REFERENCE

JA/AME/G20618WO

YOUR REFERENCE

PLEASE REPLY TO
SEVENOAKS OFFICE

3 May 2005

The European Patent Office
P.B. 5818 Patentlaan 2
2280 HV Rijswijk
The Hague
Netherlands

Attn: International Preliminary Examining Authority

Dear Sirs

Re: International Patent Application No. PCT/GB2004/002483
SEE, Richard

In response to the Written Opinion of the International Preliminary Examining Authority dated 15 March 2005, we enclose replacement pages 1, 4 to 8, 21 and 24 of the description, and a replacement set of claims.

Claim 1 has been amended to recite a rotary engine, rather than a rotary device. Basis for this amendment can be found at page 1, lines 6 and 7 of the description as filed.

A number of clarifying amendments have also been made to claim 1. Amended claim 1 recites that the second rotation elements are mounted to rotate about respective different second axes. Basis for this amendment can be found at pages 9 to 24 of the description as filed, throughout which are described engines in which the second axes are different axis.

Amended claim 1 also recites that the projecting portions of the second rotation elements have respective different radii, and that these different radii cause the projecting portions to project into the cavity by respective different amounts. Basis for this amendment can be found at page 4, lines 23 and 24 of the description as filed. Further basis can also be found at pages 9 to 24 of the description as filed.

Finally, amended claim 1 recites that, in use, fluids in a working portion undergo compression, combustion and expansion as a closed volume, and that the closed volume is defined during the compression, combustion and expansion by the same two adjacent second rotation elements. Basis for this amendment can be found at page 12, line 1 to page

13, line 9 of the description as filed. Further basis can be found at page 13, lines 17 to 21 of the description as filed.

Former claims 10, 11 and 21 to 24 have been deleted from the application, and the remaining claims renumbered accordingly. Minor amendments have also been made to the remaining claims for consistency with amended claim 1.

New claims 19 and 20 have been added to the application. Basis for new claims 19 and 20 can be found in Figure 1 to 3 as filed, and the description thereof at page 12, line 1 to page 13, line 15 of the description as filed.

In paragraph 1 of the examination report, the Examiner has objected to former claim 1 as lacking novelty over D1 (FR 1600666), D2 (US 4558669), D5 (GB 653185) and D6 (US 4013046). However, we submit that amended claim 1 is both novel and inventive over all of the cited documents.

The invention as now claimed is an engine having second rotation elements with differently sized projecting portions. These differently sized projecting portions project into the engine cavity by different amounts to achieve the different phases of an engine cycle. This provides a simple and compact engine design.

With regard to D1, this document fails to disclose an engine in which compression, combustion and expansion take place in a closed volume defined by the same two adjacent second rotation elements, as required by amended claim 1. Instead, in D1, fluids undergo compression as a closed volume defined by a single second rotation element (between two scallops; note that amended claim 1 requires the second rotation elements to be mounted to rotate about respective different second axes). In D1, the fluids undergo combustion in a closed chamber defined by neither of the second rotation elements (passages 22, 23 are sealed by the casing wall). Finally, in D1, the fluids undergo expansion as a closed volume defined by a different single second rotation element (between two scallops).

With regard to D2 and D6, these documents also fail to disclose that fluids in a working portion undergo compression, combustion and expansion as a closed volume, the closed volume being defined during the compression, combustion and expansion by the same two adjacent second rotation elements. Instead, in these documents, combustion occurs separately in a separate combustion chamber (for example, chamber 178 in Figure 19 of D2). Compression and expansion take place between only one second rotation element and the first rotation element (for example, piston 4 in Figure 19 of D2).

With regard to D5, this document fails to disclose that each second rotation element comprises a plurality of projecting portions having respective different radii about the second axis. Instead, in D2, all of the projecting portions 17 of the second rotation elements (i.e., the portions that project into the cavity) have a fixed radius.

D5 also fails to disclose that the projecting portions of the second rotation elements project into the cavity by respective different amounts because of the different radii of the second rotation elements, i.e. there is a cause and effect relationship. Instead, in D5, the projecting portions 17 project into the cavity by respective different amounts because of a varying

position of the inner surface 27 of the casing with respect to the second axis (see Figure 5, and page 8, left hand column, lines 4 to 10, of D5).

Accordingly, we submit that amended claim 1 is novel.

With regard to inventive step, we submit that none of the devices shown in the cited prior art documents could be modified in an obvious way to arrive at the subject matter of amended claim 1.

For example, we believe that D5 is probably the closest prior art, in the sense that it represents the most promising starting point from which a skilled person might be expected to arrive at the invention. However, to arrive at the invention, the skilled person would have to provide the engine of D5 with projecting portions having respective different radii, these different radii causing the projecting portions to project into the cavity by respective different amounts. If this modification were made to the projecting portions of the engine of D5 (for example, projecting portions 17 in Figure 5), the worm (for example, worm 25 in Figure 5) could not be designed so as to correctly mesh with the projecting portions.

Similar considerations apply to the other cited prior art documents.

The description, including the title, has been amended to bring it into conformity with the amended claims. In particular, in the amended pages of the description, compressors and expanders are not described as embodiments of the invention in their own right.

We submit that, in view of the above remarks, the amended claims are both novel and inventive. Reconsideration of the claims, and issuance of a favourable International Preliminary Examination Report are respectfully requested.

Yours faithfully
Elkington and Fife LLP



Nick Ertl